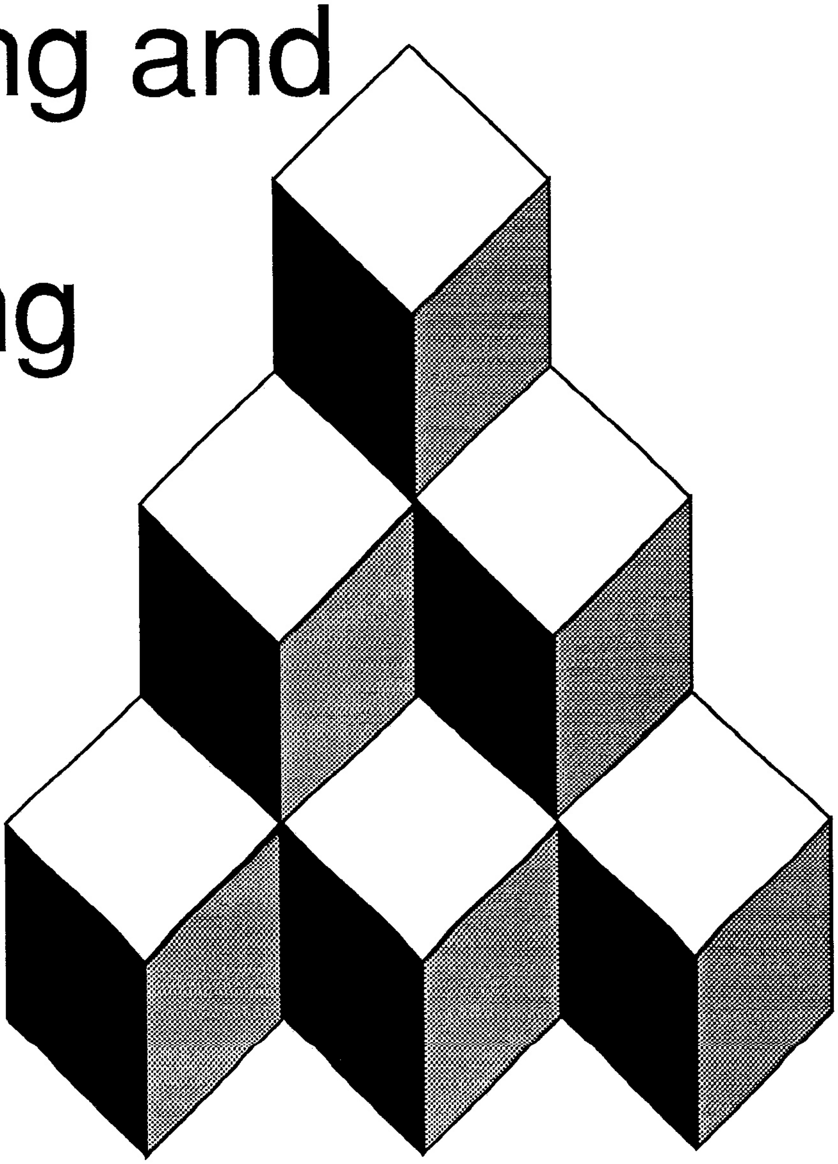
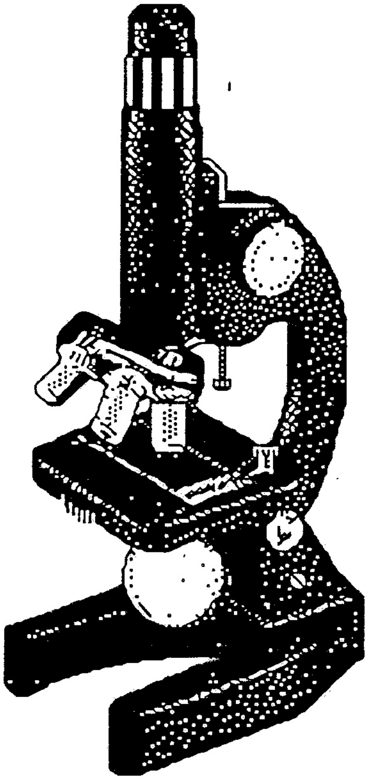
Ventura Educational Systems

910 Ramona Suite F
Grover Beach, CA 93433

(800) 336-1022

Tools for Active Teaching and Active Learning





Plant and Animal Cells

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Grover Beach, CA 93433

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Ventura Educational Systems
3440 Brokenhill Street
Newbury Park, CA 91320

(805)-499-1407

Credits

Software Design	**Ventura Educational Systems**
Instructional Technology and Programming	**Fred Ventura, Ph.D.**
Editor	**Marne Ventura, M.A.**

Dr. Fred Ventura is an experienced classroom teacher and has taught elementary, secondary and college levels. He holds a doctorate in education from the University of California, and presents workshops for educators on the instructional uses of microcomputers.

Marne Ventura is also an experienced classroom teacher and holds a masters degree in reading and language development from the University of California. As a seminar leader, Marne Ventura has assisted many teachers in learning about the educational opportunities that can be derived from the use of microcomputers in the classroom.

Other Publications Include:

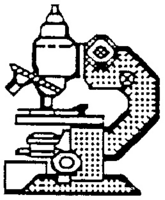
SuperGraph
GeoArt: Geometry and Art Discovery Unit
Marine Life: Anatomy of a Fish
    Anatomy of a Sea Lamprey
Senses: Physiology of the Human Sense Organs
The Plant: Nature's Food Factory
Chemaid: Introduction to the Periodic Table
The Worm: Invertebrate Anatomy
Protozoa: Introduction to Microorganisms
States: Geography Study Unit and Database
All About the Solar System
All About Simple Machines
Dr. Know: Experiments in Artificial Intelligence

Coordinate Geometry
Geometry Concepts
Marine Invertebrates
Anatomy of a Shark
VisiFrog: Vertebrate Anatomy
Computer Concepts
The Insect World
All About Matter
All About Light & Sound

Additional Program Disks

Many schools have more than one computer and to effectively use educational software require additional legal copies of a program. Additional program disks are available for use in a computer lab. The price is $10.00 per disk. Schools with a registered copy of any Ventura Educational Systems product may order additional copies of a program disk at any time. There is a 30 day warranty on original program disks. If for any reason a program disk becomes defective within 30 days of the date of purchase, Ventura Educational Systems will replace it at no charge.

Plant and Animal Cells



Program Objectives:

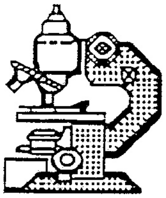
Plant and Animal Cells has been specifically designed for secondary level students of biology. The program is an interactive computer learning system for extending the base of information that an individual has about cellular structures, photosynthesis and mitosis. Several approaches to instructional software design are blended in this educational program.

The main instructional purposes of Plant and Animal Cells are given in these objectives:

1. To provide interactive self-paced lessons which present basic information about cellular structures, photosynthesis and mitosis.
2. To provide a visual database of information pertaining to cell structures and cell processes.
3. To provide vocabulary building learning games which help the student to master the terminology used in the study of cells.
4. To test the student's ability to recall information pertaining to cell structures and cell processes.

Plant and Animal Cells can be used in combination with other instructional approaches. The program provides students with an interesting learning focus where they can extend the information base that they have regarding cellar structures and the processes of photosynthesis and mitosis.

The program is divided into four main sections: Lessons, Probes, Games and Quizzes. Each section represents a particular mode of instruction and as a whole the learning system provides a comprehensive introduction to cells appropriate for secondary level students.



An Overview of Plant and Animal Cells

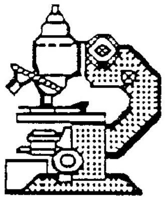
Plant and Animal Cells is a menu driven learning system which provides a variety of integrated instructional approaches to aid the student in developing a deeper understanding of cellular structures and processes.

The instructional approaches used in the Plant and Animal Cells learning system are organized as shown in the menu organization diagram. The structure of the program allows students to move from each activity or topic with ease, using a simple menu system and just a few keys. At the end of each unit the program returns to the main menu. Each student who uses the Plant and Animal Cells learning system is able to determine the pace and direction of his learning.

Text and graphics are interactively related in various aspects of the program. Drawings of cells and charts of processes represent important information and concepts of cells and cellular processes. The visual aids are intended to enhance the student's understanding of concepts which are explained in the text.

The documentation manual included with the Plant and Animal Cells learning system is designed to guide the user in the use of the program. The activity pages can be used by classroom teachers as supplementary material which supports the educational objectives of the program.

Plant and Animal Cells



Conceptual Framework for Plant and Animal Cells

The microscopic world of cells is a fascinating topic of study. Cells are the building blocks of all living things. The simplest of life forms consist of a single cell. The most complex animal forms can have trillions of cells. In this study, cells are presented as a structural unit and as a functional unit. All cells perform the same basic processes. A single-celled organism does not differ from a cell in a complex organism in terms of basic biological functions. In this unit the student explores the structure of the cell and two important processes performed by cells, photosynthesis and mitosis.

The main goal that can be achieved by using this system is an understanding of the basic structures of cells and an understanding of how each part contributes to the life sustaining functions of the cell. In 1665 when Robert Hooke first described the cell, he was actually observing cell walls and he did not observe the living protoplasm. As centuries past, scientists continued to study the cell. From all the information gathered scientists were able to formulate one of biology's most important concepts. The concept is called **cell theory** and is important because it applies to all living things. Cell theory states that the cell is the basic unit of structure and function of all organisms and that all cells are produced from other cells.

In the course of studying biology, the student develops higher order thinking skills. In order to successfully analyze, synthesize and evaluate, a student needs a solid base of scientific information. This program provides students an opportunity to acquire such a base of knowledge, and thus become better prepared for the challenges of life in a technological society. Teachers can help students develop a genuine ability to solve scientific problems. The Plant and Animal Cells learning system utilizes computer technology to provide students with a means of accessing detailed anatomical information. Motivation for learning the anatomical information is provided in the form of quizzes and games.

Content, Process and Attitude

The Plant and Animal Cells learning system focuses the student's attention on the organelles (specialized components of the cell), and biological functions of these parts. The learning system also presents detailed information on photosynthesis and mitosis, two very important cellular processes. Emphasis is placed on learning the names of the organelles and their functions in relation to the processes, with the goal being a complete understanding of how the various components work together to enable the organism to survive.

The classroom science teacher who uses the Plant and Animal Cells learning system will find that it is an interactive educational environment that provides students with the opportunity to explore many aspects of microbiology. As an information resource, the Plant and Animal Cells learning system enables students to access information which is presented in a variety of formats. The ease of use of the menu system utilized in this program makes it possible for students with little computer experience to operate the program.

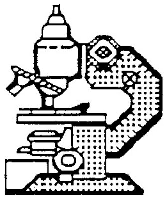
The lessons are the tutorial components of the program and allow the student to proceed through a series of sentences about the cell structures and processes in a self-paced manner. The probe allows the student to quickly access more detailed information which is graphically illustrated.

Learning games motivate students to master the anatomical terminology used in the program and a quiz for each anatomical view measures the student's progress.

Students who use the Plant and Animal Cells learning system will develop a positive attitude toward the study of microbiology because the system involves the student in the learning process by presenting options at a variety of points in the program. The menu driven format of this instructional product allows the student to explore the world of the cell in his or her own way. All options lead to interesting and rewarding activities.

Interrelationships

In the study of modern science, the relationship between form and function emerges as an important theme. The Plant and Animal Cells learning system utilizes computer technology to present textual and graphic information about how form and function relationships can be found at the cellular level. Students who use this learning system will gain from their experience essential knowledge about the various organelles and their associated biological function.



Scientific Concepts

Through the use of the Plant and Animal Cells learning system, students become more interested in the study of biology. It is important for students to have a basic understanding of cell parts and their functions because this information is an example of how form and function are related in all organisms. This knowledge is part of the basic information that contributes to an individual's basic scientific knowledge. If the student's course of study will lead him or her to a more in-depth study of biology, the knowledge gained from this learning system will be beneficial as a base for more specific information.

To develop a solid understanding of scientific concepts and true science literacy, an individual must be able to make observations and formulate and test hypotheses. This process is very difficult, perhaps impossible, without a knowledge base from which to draw. The Plant and Animal Cells learning system is designed to provide students with an opportunity to explore anatomical information in an interactive, self-directed manner and to develop a deeper interest in science. These materials are particularly useful when used in conjunction with a microscope unit.

Materials

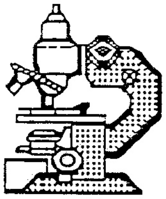
Below is a list of the materials provided in this learning system:

Program Disk
Teacher's Guide and Reproducible Masters
Materials Binder

System Requirements

The computer system described below is the minimum hardware configuration required to use this program.

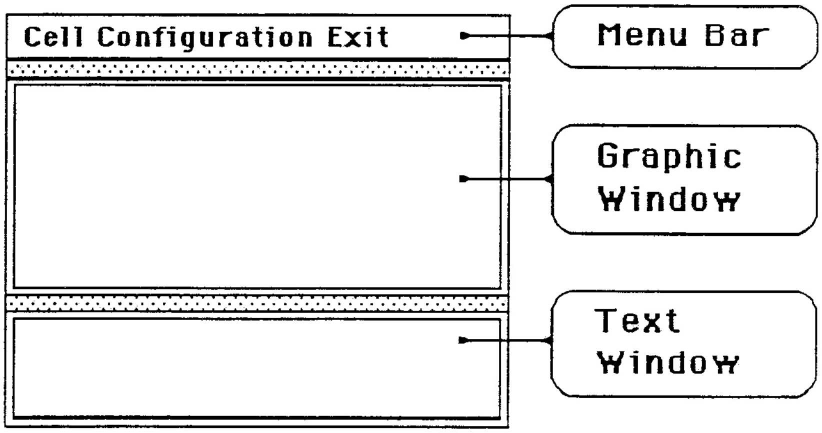
Apple // series computer
Video Monitor (color recommended)
Single Disk Drive
Programming Language: Applesoft Basic/ DOS 3.3
(portions in machine language)



Getting Started

The Plant and Animal Cells learning system is started by placing the program disk in the primary drive and turning on the computer. Control-Open-Apple-Reset can be used to 'warm start' the computer. Please consult the Apple User's Guide for complete system operating instructions.

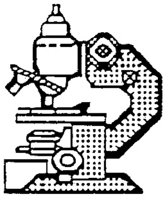
After the program has been started, the title screen will be shown and the first menu will appear at the top of the screen. The presentation areas of the screen are divided into three sections. The top line is called the menu bar and shows the options available at each step in the use of the program. The middle of the screen is used for presenting graphic information and the bottom section of the screen is primarily used for text.



Menu Control Keys

Use the right and left arrow keys to move the highlight indicator from one choice to another. Press the return key to select a choice. The escape key [ESC] may be used to cancel a choice and return to the previous menu.

[Arrows]	**moves the indicator right or left**
[Return]	**selects the highlighted option**
[Escape]	**cancels a choice and returns to a previous menu**



Main Menu

Cell	With the highlight on Cell, press return and the Structures/Processes Menu will be presented.
Configuration	If return is pressed with the highlight on Configuration, the program will give the options for selecting sound to be on or off and for choosing the type of font ('**Apple**' or '**Roman**' characters).
Exit	Press return with this option highlighted to stop using the Plant and Animal Cells learning system.
Structures	Either path from Structures/Processes Menu leads to two topic options and then to the Activity Menu. Choosing structures will give two choices for a topic: Plant Cells or Animal Cells.
Plant Cells	A diagram of a plant detailing some of the important organelles will be shown after selecting this instructional path. The diagram illustrates the main features found in a typical plant cell. The lesson, probe and quiz activities associated with this diagram introduce the functions of the organelles in plant cells.
Animal Cells	The animal cells option shows a diagram of a typical animal cells. All cells have similar parts. The learning activities associated with this path emphasize the characteristics of the organelles and their biological functions.
Processes	Two important cell processes are examined in this program: Photosynthesis and Mitosis.
Photosynthesis	The photosynthesis option causes a diagram that illustrates a chloroplast, structure of the chlorophyll molecule, an equation for photosynthesis and a graph showing the percentage of light at different wavelengths absorbed by chlorophyll. The lesson, probe and quiz in this path deal with photosynthesis in more detail.
Mitosis	Mitosis, the process of cell division, is represented in a chart showing the various stages of the process. The diagram is explained in detail in the activities associated with this instructional path.

Activity Menu

After selecting a topic from the Main Menu the program proceeds to the Activity Menu where either a lesson, probe, game, quiz or glossary can be selected.

Lesson The lesson is a self-paced learning activity where information is presented in the text window and the organism is displayed in the graphics window. The options presented in the menu bar are Next or Previous. Choosing Next advances the lesson to the next screen. Previous allows the user to back up to previous sentences in the lesson. At the end of the lesson the options: Review or Main are given. Select Review to do the lesson again or select Main to return to the first menu.

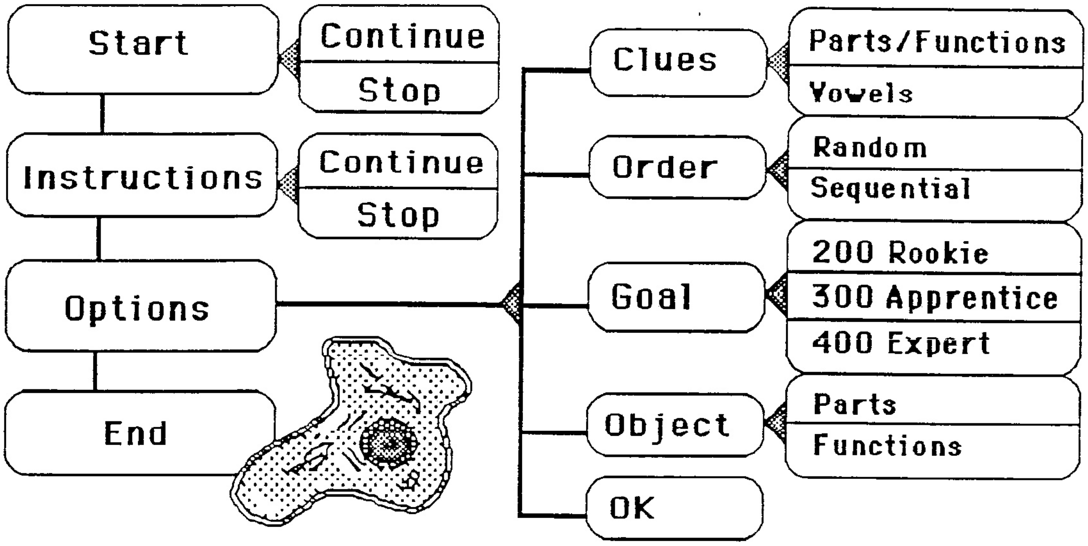
Probe The Probe is an activity where detailed information on the name of a part of the cell or aspect of a process can be quickly accessed. The program allows the user to move forward or backward through a list of terms. The Description option gives more complete information about the term. A flashing pointer shows the position on the diagram where the term is illustrated.

Games

Three word games, Identify, Scrambler and Wordsearch help to develop a better understanding of the vocabulary used in this program.

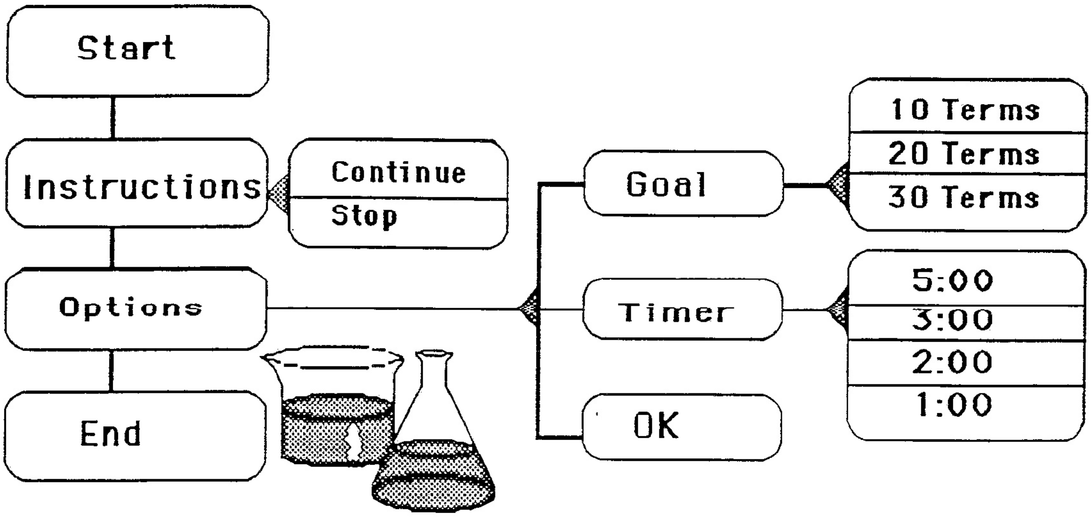
Identify The Identify game challenges the user to spell the name of an organelle, function or aspect of a process. The object of the game is to correctly spell the term or phrase which is marked in the diagram by a flashing indicator. Points are awarded for each letter correctly typed. Press the key marked [?/] to get help on a word. The game begins by presenting the options Start, Instructions, Options, or End. Select Instructions for more information about how this game is played.

Move the highlighted indicator to Options and press the return key. To set the game so that clues are given to assist in identifying the graphically indicated item select Clues from the menu and then select Parts/Functions. Setting the Parts/Functions option On causes either the part or associated biological function to be shown when the object of the game is to guess the other. Likewise, the user may opt to have the vowels in the object term or phrase be shown and to guess only consonants. This option may be turned on or off for each game. The order in which the challenges are presented can be set for either random or sequential and a goal of 200, 300 or 400 points can be set. The object of the game can be set for either parts or functions.



Use of this game is particularly effective after the student has spent some time working through the lessons and probe activities. When finished with this activity select End to return to the main menu.

Scrambler The Scrambler, as the name suggests, scrambles the letters in a term. Use the Glossary option to study the terms used in this game. The object of the game is to unscramble letters to spell as quickly as possible a science term, when given a definition of the term. The first menu in the game gives the options, Start, Instructions, Options. End.

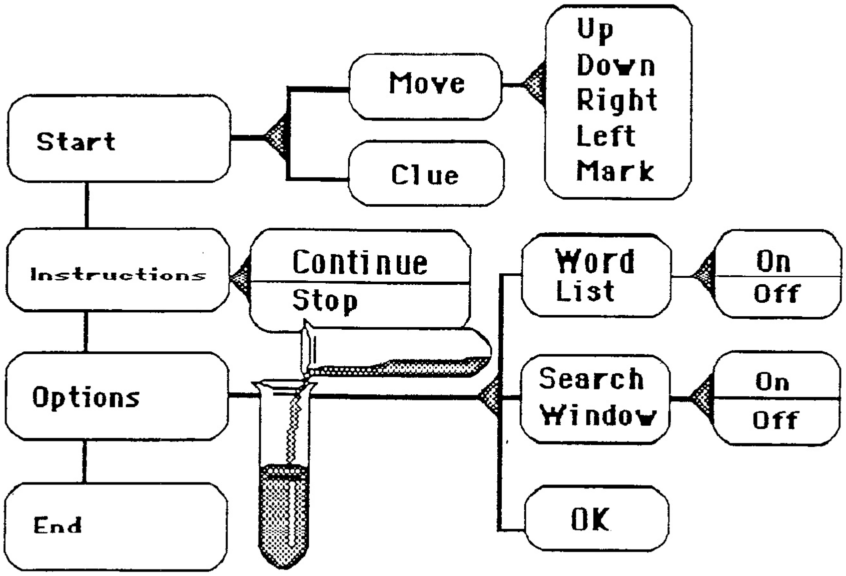


Two options are available in this game. A goal can be set for 10, 20 or 30 terms or play can continue until a certain value is reached on the timer. To set an option select Options from the menu and choose either Goal or Timer. The default setting is for the game to terminate after 10 words.

When the Start option is selected the computer will retrieve a term and its definition from the disk. The definition of the term will be given in the text window. The letters in the term will be scrambled and shown in boxes in the middle of the screen. Type the letters in the term in the correct order to fill the blank boxes. When all letters have been correctly played, the screen is cleared and the next term is given. The game continues until the goal has been reached.

Wordsearch

Wordsearch is a computerized version of the popular paper and pencil activity. The first menu that appears after selecting Wordsearch from the Games Menu gives the options: Start, Instructions, Options, End.



Novice users of this game may wish to set the Word List and Search Window options to On. The Word List option determines whether or not the list of words hidden in the puzzle is to be shown on the screen while solving the puzzle. The Search Window shows the group of letters that has been indicated when the computer checks them.

After selecting Start, the computer will 'think' for a minute and create a unique puzzle using a random set of words from the file of words pertaining to the topic that has been selected from the menu. When the puzzle has been created the letters in the puzzle will be shown on the grid. At this point the options Move and Clue will be shown. Select Clue to see one of the words in the puzzle or select Move if a word has been located in the puzzle. Select Up, Down, Right, Left to move the indicator to the first letter of the word and then select Mark. Move the indicator to the last letter of the word and select Mark again. The computer will check the letters along the line between the two marks. If the letters make a word that is in the set of terms, that word is removed from the list. Play continues until all words in the list have been located in the puzzle.

If the search window is 'on' the computer will display the set of words in forward and backward order, illustrating that words can be marked either from first letter to last or from last to first.

Quiz

To take a quiz on the information pertaining to one of the topics, select the Quiz option from the Activity Menu . The next menu will show simply, Begin or Menu. Select Begin to start the quiz. A question will be shown at the bottom of the screen. Some of the questions are fill-in-the-blank type, some are yes/no and true/false, some are questions with a single word or short answer. In all cases the possible answers are shown at the top of the screen in the Menu Bar. Move the indicator to the desired answer and press return.

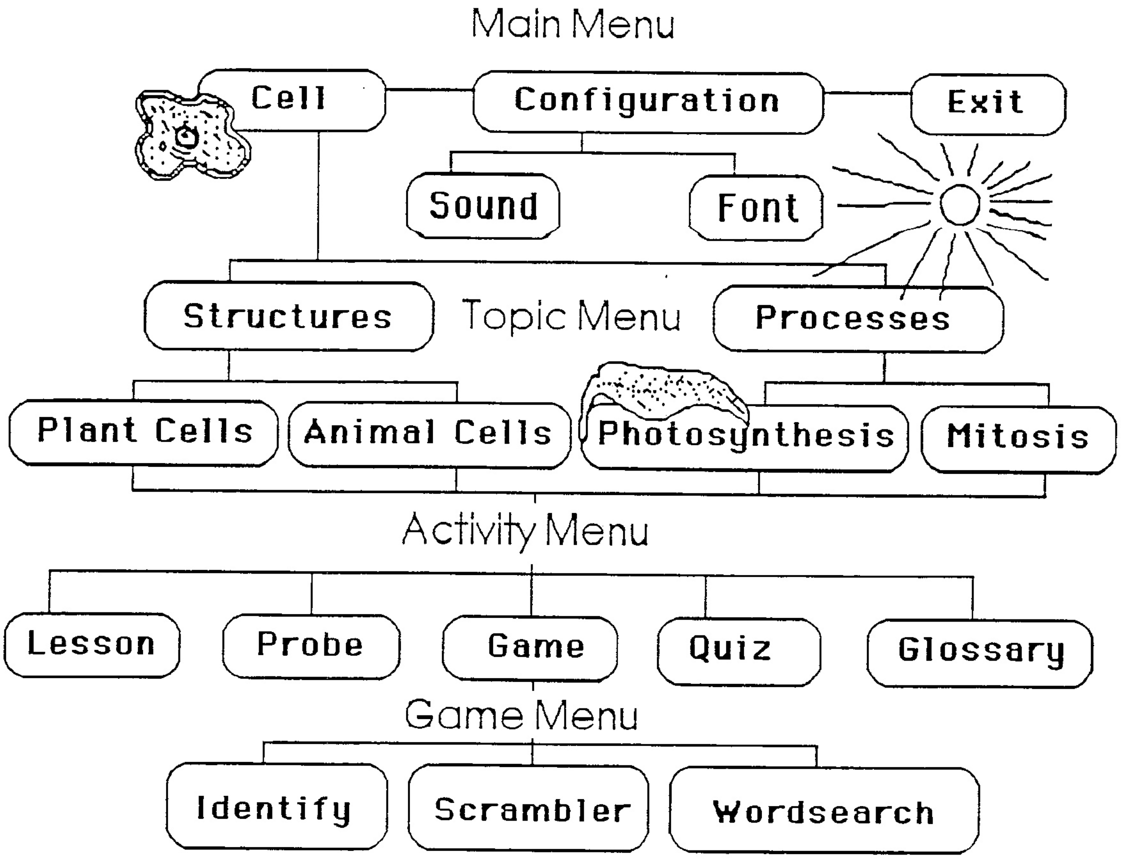
At the end of the quiz the options: Redo, Performance, and Menu will be given in the Menu Bar. To check performance on the quiz, select Performance and a percentage score will be given. If desired, choose Redo to try again on the quiz.

Glossary

The Glossary option from the activity menu allows the user to explore the definitions of the terms used in lessons and probes. When the first word in the glossary is displayed in the menu bar section of the screen the glossary is ready. To select a term use the arrow keys to move up and down the list. Press return to read the definition of the term. These terms and definitions are used in Scrambler game.

Plant and Animal Cells

Menu Organization



Menu Control Keys

Use:

Arrow Keys	Move the menu indicator.
Return	Select the indicated choice.
ESC	Return to previous menu.

Name Date

Investigating Plant Cell Structures

Select Cells-Structures-Plant Cells-Lesson from the menu. Read the Lesson. Answer these questions by writing a complete sentence.

1. Describe the events that occurred in 1665 that lead to the development of cell theory.

2. State the cell theory in your own words.

3. What do all cells have in common?

4. What is protoplasm?

5. Chemical reactions in the cell are called metabolism. What are the two types of metabolic reactions?

Name Date

Investigating Mitosis

Select Cells-Processes-Mitosis-Lesson from the menu. Read the Lesson. Write a description of each phase of mitosis in the spaces provided below.

1. **Interphase**

2. **Prophase**

3. **Metaphase**

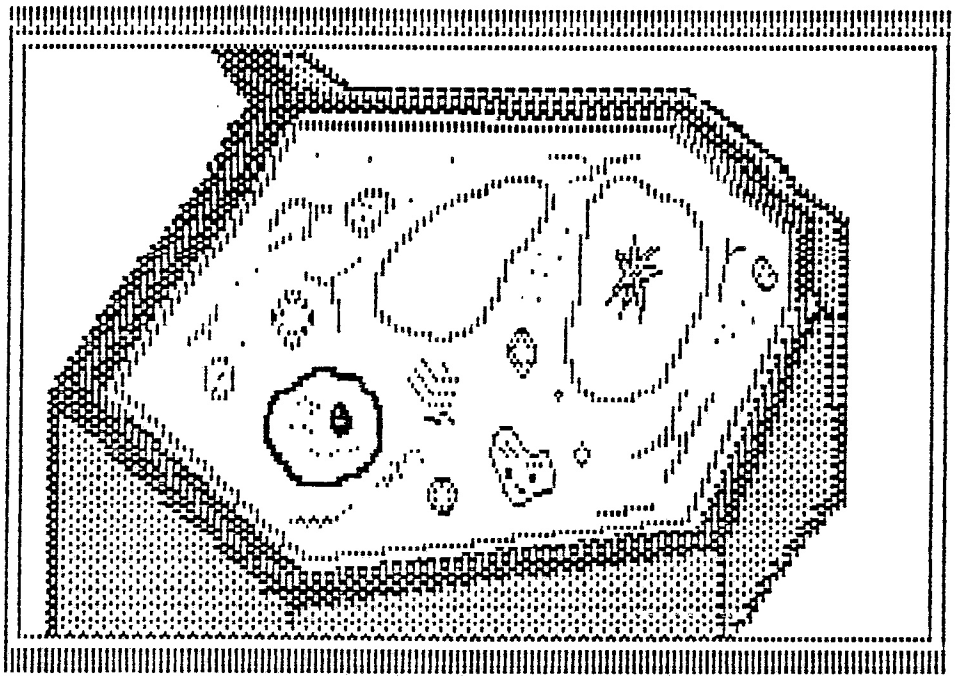
4. **Anaphase**

5. **Telophase**

Name Date

Probing Plant Cell Structures

Select Cells-Structures-Plant Cells-Probe from the menu. Use the Probe to locate parts of the plant cell. Write the name of the part and show its location.



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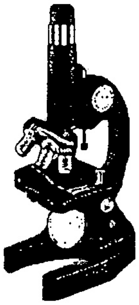
B		J	
C		K	
D		L	
E		M	
F		N	
G		O	
H		P	

Name Date



Investigating Animal Cell Structures

Select Cells-Structures-Animal Cells-Lesson from the menu. Read the Lesson. Answer these questions by writing a complete sentence.

1. What are organelles?

2. What is meant by the term 'division of labor'?

3. Describe mitochondria. Tell about its structure and function.

4. What do scientists think about the endoplasmic reticulum?

5. Describe two important parts found in the nucleus of the cell.

Name Date

Investigating Photosynthesis

Select Cells-Processes-Mitosis-Lesson from the menu. Read the Lesson. Answer these questions by writing a complete sentence.

1. What are chloroplasts and where are they found?

2. What is the role of grana in photosynthesis?

3. What causes the leaves of deciduous plants to change colors in autumn months?

4. What is important about chlorophyll?

5. What are the raw materials for photosynthesis?

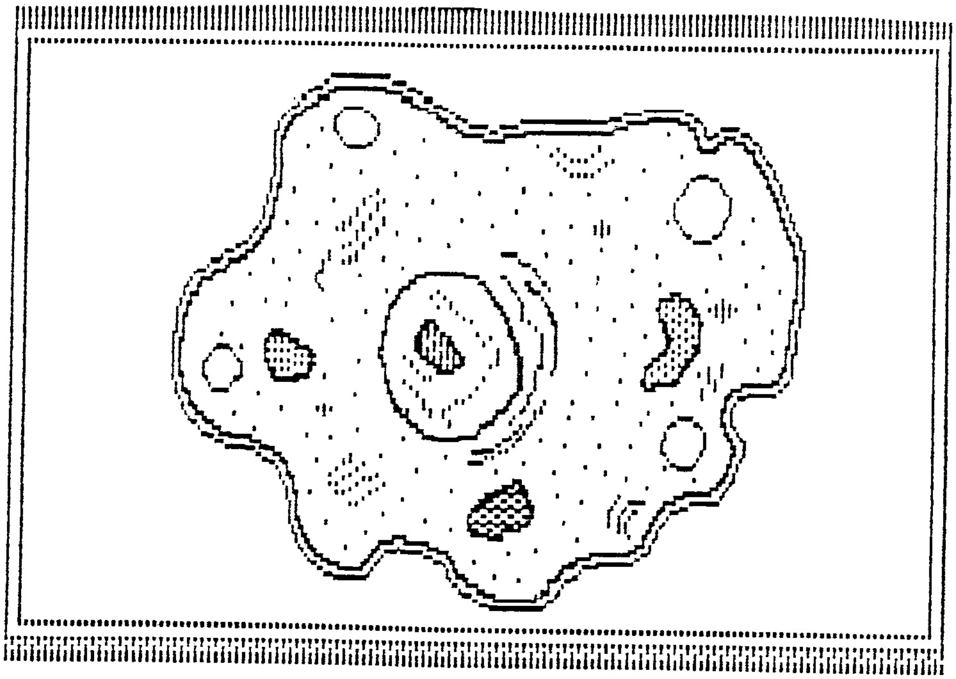
6. What are the products of photosynthesis?

7. Which color of light is least absorbed by chlorophyll?

Name Date

Probing Plant Cell Structures

Select Cells-Structures-Animal Cells-Probe from the menu. Use the Probe to locate parts of the animal cell. Write the name of the part and show its location.



A		H	
B		I	
C		J	
D		K	
E		L	
F		M	
G			

Name Date

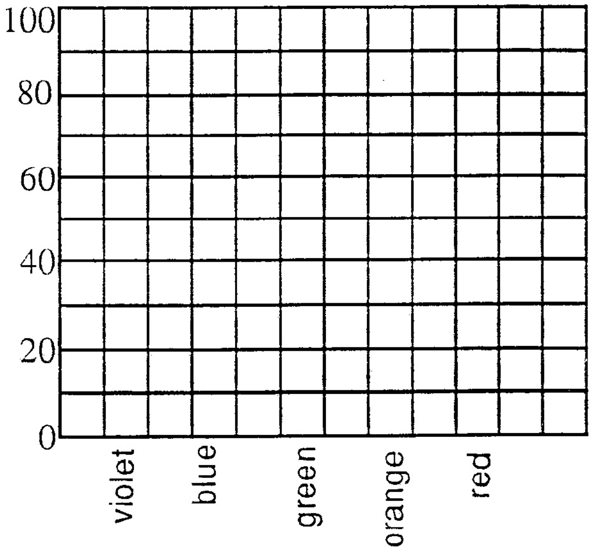
Comparing Photosynthesis to Respiration

Use the lessons and probes to find these answers. Compare photosynthesis in plant cells with respiration in animal cells by completing this chart.

	Photosynthesis	Respiration
Reactants		
Products		
Energy		
Type of Reaction		
General Equation		

A scientist obtained these results in an experiment where the percentage of light absorbed by chlorophyll was observed. Make a bar graph to show the results.

Color	Percentage of Light Absorbed
violet	56
blue	86
green	11
orange	68
red	53



Name Date

Performance Records

Use these charts to record your performance on the games and quizzes.

Date	Order	Goal	Object
	Random		Parts
	Sequential		Parts
	Random		Functions
	Sequential		Functions

Date	Time	Goal (Terms)	Average Time/Term

Date	Write the list of words used in the puzzle.	